NASA SBIR/STTR Technologies

All-digital CMOS-based Photodiode Camera

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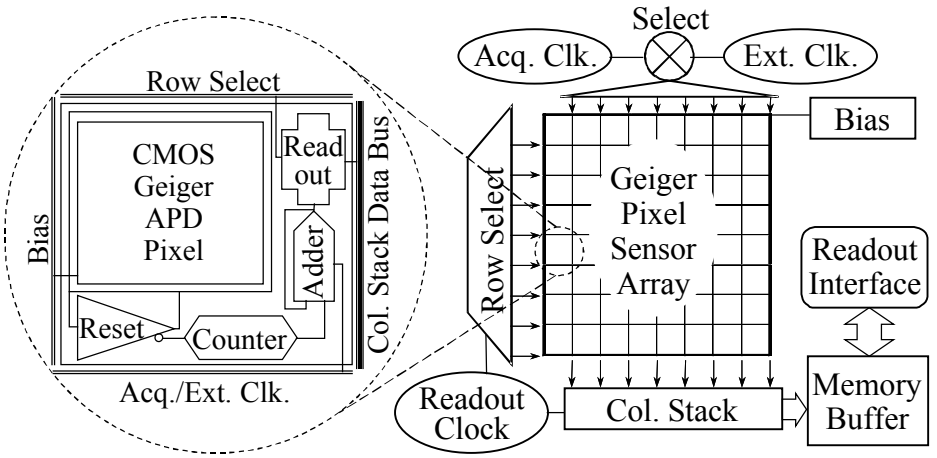
Proposal No.: 02-E1.01-8848

Identification and Significance of Innovation

- The readout of the analog signal in both CCD and CMOS APS cameras introduces noise, which limits their sensitivity and performance.
- Migrating Geiger APD pixel technology to a CMOS compatible process enables the development of a fully integrated, all-digital camera that counts individual optical photons.
- As the next stage in the evolution of CMOS APS camera technology, the proposed camera provides an ideal platform for integrating digital signal-processing capabilities at the pixel level.



Technical Objectives

- Determine the best CMOS process, available through MOSIS, for fabricating CMOS Geiger APD pixels, extending the nearIR performance, & integrating quenching & signal processing circuits;
- Specify design goals for the all-digital, CMOS Geiger APD camera.

Work Plan

1. Survey the CMOS fabrication processes available through MOSIS;
2. Estimate and model the performance of the Geiger APD pixels;
3. Design circuit concept for quenching the Geiger avalanche;
4. Fabricate prototype Geiger APD pixels and quenching circuits;
5. Test and characterize prototype Geiger APD pixels;
6. Specify Design Goals for the CMOS Geiger APD camera.

NASA Applications

Airborne, spaceborne or UAV instruments for measuring climate, meteorological parameters, aerosols, clouds, water vapor, vegetation index, chlorophyll fluorescence, 2D and 3D surface terrain mapping.

Non-NASA Applications

Widespread use in high-performance imaging instrumentation for defense and medical applications, including LADAR and DOT.

Contacts

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